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14. ABSTRACT

Cheryl Golden, Ph.D. of LeMoyne Owen College (LOC) and Sue Greco, Sc.D. of Abt Associates Inc. (Abt) are the co-Principal Investigators for the Partnership for Asthma Trigger-free Homes (PATH). The PATH study's goal is reducing the asthma disease burden on low-income housing residents by means of a peer-based education program. Although asthma is a complicated multi-factorial disease with both genetic and environmental components, reducing levels of certain indoor asthma triggers can reduce the disease symptoms and severity. Indoor asthma triggers include allergens (dust mite, cockroach, cat, dog, rodent), environmental tobacco smoke (ETS), pesticides, and molds. The Project Coordinator will train participants (parents or guardians over 18 years old) recruited from the Memphis Housing Authority and the Memphis Health Center about asthma, in general, and indoor asthma triggers, in particular. Moreover, participants will learn about behaviors they can adopt or modify to reduce indoor asthma triggers. The training will be reinforced by Community Peer Educators (CPE's) – students from LeMoyne-Owen College and resident presidents of four MHA housing developments. (After the successful implementation of this program in public and low-income housing, PATH may be transferred to a military setting if additional funding is procured.)

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Asthma, longitudinal study, asthma education, indoor asthma triggers, dust mites, cockroach allergens

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Executive Summary

The Partnership for Asthma Trigger-free Homes (PATH) study's main goal is reducing the asthma disease burden on low-income housing residents by means of a peer-based education program. Although asthma is a complicated multi-factorial disease with both genetic and environmental components, reducing levels of certain indoor asthma triggers can reduce the disease symptoms and severity. Indoor asthma triggers include allergens (dust mite, cockroach, cat, dog, rodent), environmental tobacco smoke (ETS), pesticides, and molds. The Project Coordinator trained participants (parents or guardians over 18 years old) recruited from the Memphis Housing Authority (MHA) and the Memphis Health Center (MHC) about asthma, in general, and indoor asthma triggers, in particular. Moreover, participants learned about behaviors they can adopt or modify to reduce indoor asthma triggers. The training was reinforced by Community Peer Educators (CPEs) – students from LeMoyne-Owen College and the University of Tennessee Health Science Center, and resident presidents of four MHA housing developments. Preliminary data analysis suggests that the program was effective in improving general asthma knowledge in the target population. Final results will be completed and included in the Final Report.

I. Adherence to Statement of Work

The PATH study's Statement of Work (SOW) lists Year 1 and Year 2 goals[1]. The USAMRMC evaluated the PATH study's First Annual Report (covering the period August 1, 2007 to July 31, 2008) and deemed the Year 1 goals as "partially completed" and the Year 2 goals as "not yet initiated". Furthermore, there were no technical issues found. Several of the Year 1 goals required USAMRMC protocol approval, which was obtained in October 2008.

Below, we summarize all Year 1 and Year 2 SOW goals and accomplishments in a tabular format. We elaborate upon the accomplishments in subsequent sections of this Second Annual Report (covering the period August 1, 2008 to July 31, 2009).

Year 1 SOW Goals and Accomplishments

Year 1 (covering August 1, 2007 – July 31, 2008) of the PATH study involved laying the foundation for the study: planning, partnership building, and development of the protocol, study instruments, study schedule, analysis plan, student and resident president courses, physician/nurse practitioner courses, etc. The Year 1 SOW goals and accomplishments are listed in

Table 1All Year 1 goals have been completed. Most were completed in Year 1, however some Year 1 goals required USAMRMC protocol approval, which was obtained in October 2008 (i.e., Year 2).

[1] The USAMRMC approved the PATH study's revised SOW on August 10, 2008.

Table 1. Year 1 Statement of Work (SOW) Goals and Accomplishments (including those completed in Year 2)

Year 1 (covering period between August 1, 2007 – July 31, 2008)	
SOW Goal	**Accomplishment(s)**
• Establish contacts at the Memphis-Shelby County Heath Unit (MSCHU), the Memphis Housing Authority (MHA), and the Memphis Health Center (MHC) in Memphis, Tennessee.	• Contacts were established in Year 1. • In Year 2, members of the MSCHU, MHA, and MHC continued to meet to discuss study implementation.
• Develop full Protocol for the PATH program.	• The full protocol was developed in Year 1. • Based on HRPO recommendations (dated August 14, 2008), the protocol, recruiting documents, consent forms, and survey documents were modified in several ways. The updated protocol was submitted to and approved by LOC IRB, Abt Associates Inc. IRB, and HRPO in Year 2. • Final HRPO approval was received September 25, 2008 • Additional modifications have been made as appropriate in Year 2 and the co-PIs continue to update the protocol and request IRB modifications as required.
• Develop data analysis plan.	• Completed in Year 1.

Year 1 (covering period between August 1, 2007 – July 31, 2008)	
SOW Goal	**Accomplishment(s)**
• Develop pre- and post-education surveys	• Completed in Year 1. • In Year 2, surveys have been updated based on HRPO and other IRB recommendations. Modifications to LOC and Abt Associates Inc. IRB's have been received for these updates.
• Develop Participant Education Session	• Completed in Year 1.
• Develop courses for Student and Resident President Community Peer Educators.	• The courses were still under development during Year 1. • In Year 2, the courses for Student and Resident President CPEs were finalized by Abt Associates Inc. in consultation with LeMoyne-Owen College. • In Year 2, LOC developed a Student CPE academic course for the 2008/2009 academic year.
• Recruit and train LeMoyne-Owen College students and MHA Resident Presidents as Community Peer Educators and data gatherers.	• In Year 1, LOC fostered relationships with LOC students and MHA resident presidents to encourage recruitment into the study. • In Year 2, approximately 20 LOC students and 10 MHA resident presidents were recruited. (There was attrition and re-training on both fronts.) • Student CPE training was conducted in three parts: (1) August 2008 training by Abt Associates Inc.; (2) Fall 2008/Spring 2009 course at LeMoyne-Owen College; and (3) December 2008 training by Abt Associates Inc. • Resident President CPE training consisted of two parts: (1) August 2008 and (2) December 2008 training by Abt Associates Inc. • Additional Student and Resident President CPE training was conducted by the Study Coordinator as required during the study. • All CPE recruiting was completed in December 2008

Year 1 (covering period between August 1, 2007 – July 31, 2008)	
SOW Goal	**Accomplishment(s)**
• Train PATH study staff	• Formal training of PATH study staff began and was completed in Year 2 • Associates Inc. provided on-site training to LOC senior staff in August 2008 and December 2008, as well as remotely numerous times by telephone or using web-based interactive programs like "GoTo Meeting". • Abt Associates Inc. delivered a training program for MHC physicians and nurse practitioners in August 2008 • All PATH staff training was completed in March 2009
• USAMRMC Annual Report (First)	• Submitted to USAMRMC August 2008 • Deemed acceptable by USAMRMC November 2008

Year 2 SOW Goals and Accomplishments

Year 2 (covering August 1, 2008 – July 31, 2009) of the PATH study involved recruitment, survey administration, education delivery, home assessments, data analysis, and information dissemination. The Year 2 SOW goals and accomplishments are listed in Table 2.

Table 2. Year 2 Statement of Work (SOW) Goals and Accomplishments

Year 2 (August 1, 2008 – July 31, 2009)	
SOW Goal	**Accomplishment(s)**
• First (pre-education) Survey Administration (for all Participants)	• A total of 256 participants consented to participate in the study and completed the First Survey.
• Quality-of-life (QOL) Survey section for subset of Participants who care for an asthmatic child.	• Surveys were delivered and results are being analyzed. Approximately 100 participants who care for an asthmatic child have completed both First and Second Surveys
• Project Coordinator delivers Education Session to Participants	• A total of 232 (91%) of the 256 study participants received the educational intervention delivered by the Project Coordinator and project staff

Year 2 (August 1, 2008 – July 31, 2009)	
SOW Goal	**Accomplishment(s)**
• Indoor environmental sampling (i.e., Home Assessment) in a subset of MHA homes (to the extent possible).	• The indoor environmental sampling component consisted of the sticky trap counts and checklist data, which were completed for 59 participants/homes. Please see Home Assessment below.
• Baseline analysis of study population characteristics/surveys.	• Complete. Please see Table 44 for information related to baseline characteristics of the study population.
• Second (post-education) Survey Administration (for all Participants)	• A total of 204 (80%) of the 256 study participants completed second survey
• Quality-of-life (QOL) Survey section for subset of Participants who care for an asthmatic child.	• All data have been collected. QOL data is currently being analyzed.
• Evaluate effectiveness of peer-education program through pre- and post-intervention:	• All data have been collected and double-checked upon entry into the data collection system (Checkbox). A second round of QC is occurring and data analysis is proceeding.
• Responses to questionnaires regarding indoor asthma trigger knowledge and behaviors (all homes; n = 204).	• All data have been collected and double-checked upon entry into the data collection system (Checkbox). A second round of QC is occurring and data analysis is proceeding.
• Levels of indoor asthma triggers (sub-sample of homes; n = 59).	• All data have been collected and double-checked upon entry into the data collection system (Checkbox). A second round of QC is occurring and data analysis is proceeding.
• QOL surveys (sub-sample of homes; n = 100).	• All data have been collected and double-checked upon entry into the data collection system (Checkbox). A second round of QC is occurring and data analysis is proceeding.
• Evaluation of program by Participants, Community Peer Educators, LeMoyne-Owen College and Abt Associates Inc.	• Participants shared positive feedback with partners about PATH project, through course evaluations undergraduate students documented value of PATH project, LOC and Abt Associates PATH research Team were recipient of positive feedback from residents and partners.

Year 2 (August 1, 2008 – July 31, 2009)	
SOW Goal	**Accomplishment(s)**
• Information dissemination via communicating results to the community, progress reports to USAMRMC/DOD, journal publication, and conference presentations (American Public Health Association, International Society of Exposure Analysis, etc.)	• Dr. Golden delivered a poster on the PATH study at the USAMRMC Military Health Research Forum, August 31-September 3, 2009 in Kansas City, Missouri • Dr. Greco will deliver a poster summarizing the study results at the American Public Health Association (APHA) meeting in November 2009 in Philadelphia. • The USAMRMC Annual Report (Second) is contained herewith. On August 4 we obtained a formal extension to submit the report by September 30 instead of August 20, 2009.

II. Training, Recruiting and Retention Accomplishments

The PATH research team expended a considerable amount of time and effort in building community partnerships, which allowed for the successful recruitment of participants and training of LeMoyne-Owen College students. Each of these activities is described in detail below.

Developing and Sustaining the Community Partnerships

Consistent with the principles of Community-Based Participatory Research (CBPR), the PATH research team was guided by the underlying precept to work with community partners and to engage them in all aspects of the PATH project. We recognized that collaborative partnerships are essential to accomplish the outcomes of our study and our goal to address the persistent problem and health care disparity of children with asthma. Consequently, community involvement is evident in the history of the PATH Project. A timeline and activities of our collaboration with MHA and MHC are highlighted (See Table 3 below.)

Each partner experienced reciprocal benefits as "co-investigators" in the PATH study. Our partners' knowledge and experience with their constituencies contributed to effective and efficient planning and decision-making throughout the project. Trust and credibility of the PATH team developed without difficulty because our partners were fully engaged in the study, thus they bridged the gap between the community and the PATH team. Our partnerships expanded project resources in very positive ways. We gained personnel and other resources from MHA and MHC. All partners and their constituencies were benefactors of a transfer of knowledge and experiences that were unique to each party. Study participants were motivated by the interest we had in their immediate community and welfare. They were exposed to academicians and students who served as role models and who shared information about educational and community opportunities. Study incentive provided an unexpected monetary source that may a difference in the participants' lives, however small. For example, a grandmother was "tickled pink" that she could buy her grandson the only birthday gift he would probably receive. Through PATH, we made some impact on capacity-building and empowerment of the community through education and collaboration; both intended goals of CBPR and PATH. And the partnership has already yielded another collaborative research opportunity between MHA and LOC. This is an example that indicates the potential of on-going opportunities for collaboration between and among existing parties.

Our journey as collaborators did experience challenges as well. Our initial recruitment period was disappointing which imposed more demands and stress on individuals who were already busy with ongoing obligations and responsibilities. The Resident Presidents were particularly vulnerable to stress and seem to internalize the recruitment issues as their failure. The recruitment deadline had to be extended by several months therefore all study activities and their involvement were extended and increased. All partners struggled with "study fatigue". Our partners declared their commitment to be a part of a successful project; not a failed one. Their tenacity provided the buoyancy for everyone to rebound Through our existing mechanisms (such as the PATH Coordinating Committee and MHA Resident President's Council), we set-forth a strategy to increase the participant's gift incentive and we renewed our collaborative relationship.

Table 3. Summary of Collaboration Activities and Timeline

Dates	Collaborative Activities
2004 - 2006	• Early collaboration between representatives from Memphis Health Center (MHC) and LeMoyne Owen College (LOC). A series of meetings was held to explore a project that would have an impact on reducing asthma/preventing the incidence of asthma in children These early explorations germinated into a definitive proposal and were the precursor of the PATH project.
2006 - 2007	• Memphis Health Center and Memphis Housing Authority (MHA) gave consent as project sites for accessible population for recruitment of study participants
2007 - 2008	• Early Fall, 2007 LOC PATH Team met with representatives from MHA including Chairman of MHA Resident Council, an organization comprised of the Presidents of all Resident Associations at MHA. Explained study and obtained willingness of MHA representatives to be a part of our study team. This meeting accomplished the purpose of building relationship early in the project that would be sustainable throughout the life of the study • Spring, 2008, had first meeting with all Resident Presidents (8) who enthusiastically agreed to participate as a part of the PATH team • After initial meeting with Resident Presidents, PATH study included as a standing item on the Council's monthly agenda. PATH project staff communicated information about the project and defined the role of MHA and Resident Presidents during planning and implementation phases of the study.
	• LOC PATH team met with representatives of MHC, including the Executive Director, the Medical Director, and Director of Community Outreach. MHC strongly endorsed study and pledged their support. Representatives discussed reciprocity of our relationship such as sharing data for their Asthma Collaborative Project.
	• Established the LOC PATH Coordinating Committee consisting of a representative from MHA, MHC, and PATH research team. Project Coordinator/ Lead Researcher served as Chairperson of the Planning group. Agreed to meet monthly/as needed and to rotate meetings to all sites (MHC, MHA, and LOC)
	• Explored video-conferencing with LOC PATH Coordinating

	Committee and Abt Associates. Not possible due to security of site (firewalls) essential to Abt Associates' operating standards. Agreed to use of telephone conferencing as needed
	• With the assistance of LOC PATH Coordinating Committee, developed PATH Protocol that established specifics of PATH study activities and roles of community partners. MHA Resident Presidents' identified as Community Peer Educators and role defined as recruiters and community advocates for change (see Protocol). To facilitate the building of trust and credibility with the MHA and MHC populations, MHC enhanced its participation by expanding the role of the Director of Community Outreach to include assisting with recruitment functions at MHA sites and volunteered one of its health care providers (a nurse practitioner) to teach education session to MHC study participants.

2008 - 2009	• July, 2008 MHA and MHC engaged in training sessions
	  • Abt Associates conducts training session for MHA Presidents and representatives
	  • Abt Associates conducts training session for MHC staff and representatives
	  • Resident Presidents participate in two-day training designed for CPEs (example of commitment)
	  • Facilities for PATH training provided by MHA
	  • Abt Associates PATH Staff meet LOC, MHA, and MHC officials
	• December, 2008 MHA and MHC representatives, including Resident Presidents, participate in Pilot Study
	  • MHA provides security and vans for transportation at no cost to project
	  • Abt Associates conducts a second training session for Resident Presidents
	• LOC PATH Coordinating Committee continues to meet as planned to develop Final Protocol and to guide implementation of study
	• LOC PATH staff continue to attend monthly Presidents Council meetings as planned
	• MHA and MHC staff and Presidents participate in implementation of study, January 22, 2009 as planned (see Protocol)
	  • MHA Presidents and staff distribute recruitment flyers and brochure
	  • MHC participate in final implementation training session
	  • MHC initiates implementation study as planned
	  • MHA enhances Home Assessment process by providing drivers, vans and security
	• Mid-Spring, 2009, MHA Housing Director communicates value of PATH Project to residents via letter to residents
	• June, 2009 data collection phase ends and letter of appreciation disseminated to residents
	• To-date: LOCPATH Coordinating Committee sustaining through completion of study
	  • Will assist with dissemination of study findings on or before December, 2009

Student CPE Recruitment and Training

PATH Community Peer Educators (CPE) included LOC undergraduate students and graduate students from the University of Tennessee Health Science Center located in Memphis, TN. CPEs from LOC were recruited from participants in the Wellness Program, a collaborative project between LOC and Meharry College of Medicine in Nashville, Tennessee. The aim of the PATH project was synergistic with the Wellness Project and students were able to meet an obligatory service project component of the Wellness Program by choosing PATH as a service project option. The Wellness Program included annual summer research training institutes and on-going research-oriented activities throughout the academic year. Students were expected to participate in all activities, to prepare poster presentations and to verbally present their projects.

Abt Associates conducted training workshops for all CPEs in August 2008 and December 2009. The December 2009 workshop prepared CPEs for the Pilot Study and all study activities. . Training and study preparation were sustained through mandatory enrollment in a one-credit hour Service Learning Course for the duration of the study and an intensive schedule that provided a series of training sessions that coincided with study activities. Graduate student CPEs were required to participate in all training activities except the Service Learning Course. All PATH training was completed by March 2009.

Competing demands for CPEs' time were the major challenges for the PATH study. In addition to class schedules, most of the students worked, some were caretakers of families/or children and many often had life-stressors such as financial needs and other social conflicts. These were barriers that resulted in CPE attrition and the necessity to recruit and train additional CPEs to replace those lost to attrition.

Participation in the study was a professional and personal development experience for all CPEs. All received a stipend that contributed needed financial benefits to both the undergraduate and graduate CPEs. The undergraduate CPEs grew in poise and confidence from the content of PATH training, the practical experiences obtained from participation in the study, and the opportunities to present their projects in public and professional venues. The graduate students valued the rare opportunity to participate in a real-life project of the magnitude of the PATH study. Throughout the project CPEs gave verbal testimony about the value of the project to each of them. The course evaluations for the Service Learning documented the research knowledge and skills gained from their involvement in the study (100% indicated positive benefits).

Participant Recruitment and Retention

The PATH study experienced an unexpectedly low recruitment response that was disappointing. This was especially difficult because it was far below the expectations of our community partners and did threaten the cohesion and spirit of the partnership. MHC enhanced its staff's involvement in recruitment of study participant and their renewed efforts increased study enrollment from that site. The initial gift incentive did not prove to be incentivizing. We addressed the low recruitment response by extending the recruitment phase of the study and increasing the gift incentives. We met our target recruitment goal by successfully enrolling 256 study participants of which 204 completed

the main study activities, 59 of whom also volunteered for and completed all Home Assessment activities.

Despite our best efforts to retain study participants, there was some attrition, as might be expected in this target population. Increasing the incentive had a positive effect on the recruitment and retention rates. The overall attrition for participants recruited from MHA was 22.2%, while that for participants recruited from MHC was 21.1%.

III. PATH Reportable Outcomes

All PATH study data have been collected on pencil and paper surveys, and then entered into our electronic database program, Checkbox. All data were double-checked upon entry, and we are in the process of providing additional QC for 5% of the data. There were 204 Participants who completed the First Survey, the Education Session, and the Second Survey. (Of these Participants, almost half were parents or caregivers of at least one child with asthma.) There were also 59 Participants who completed all aspects of the Home Assessment. Our other records will be used to validate, confirm, or correct survey responses if necessary (e.g., MHA development). Once the final QC checks and preliminary data analysis are complete, we will continue to analyze the data according to our protocol. At present, only the demographic characteristics and a few grouped survey responses have been evaluated.

Since we are interested in the difference in the study variables before and after the Education Session, we have begun exploratory analyses to compare single item responses from the First (pre-education) and Second (post-education) Survey. We have also begun to combine related survey item responses into a scale, to provide a single, but more complex measure of the Participant's knowledge, behaviors, and trigger levels. Within each survey, the correlation will also be explored between related item responses regarding asthma/trigger knowledge, behaviors to reduce triggers, and self-reported trigger levels.

Below are some preliminary results describing the study population and summarizing key outcomes derived from the survey responses. Our plan is to continue QC activities and to continue analyzing the data, evaluating improvements in knowledge as a result of the Education Session. We will also develop mixed models to examine other variables which may influence the difference between the First and Second Survey results. Furthermore, we will begin analyzing the subgroup of Participants who care for an asthmatic child as well as the subgroup of respondents who have completed the home assessment.

Description of Study Population

Table 4 summarizes the demographic characteristics of PATH study Participants who completed the First Survey, Education Session, and Second Survey. A total of 204 Participants completed all three activities, though a much larger number completed only a portion of the study activities (See Section II for details). The majority of the participants (88.7%) are female. Over two-thirds of Participants were recruited from an MHA development; the remainder was recruited through the MHC. Most of the MHA residents (84.2%) lived in Foote Homes or Montgomery Plaza. Nearly half of the survey respondents (49%) are parents or caregivers to at least one child with asthma. Over half of participants were below the age 35 (53.9%) and over half lived in a household consisting of four or more people (54.9%). The majority of participants (68.7%) had less than or equal to high school education.

We are in the process of finalizing QC checks on the data, such as resolving final numbers of Participants from MHC or MHA, and numbers who have completed the Home Assessment. In some instances, additional records will be necessary to confirm or correct data quality issues. For example, while all participants (n = 204) were recruited through MHA or MHC, survey records indicate that

133 were recruited through MHA and 67 through MHC (totaling only 200). Furthermore, while we have 59 completed Home Assessments, 92 survey respondents indicated that they participated in the Home Assessment (data not shown in table).

Table 4. Description of PATH Study Population

Population	**n (%)**
Completed First Survey, Education Session, and Second Survey	204 (100%)
Female	181 (88.7%)
Age:	
25 years old and under	34 (16.7%)
26 to 35	76 (37.3%)
35 and up	93 (45.6%)
Recruited through Memphis Housing Authority (MHA)	133 (65.2%)
MHA Development (percentage of those recruited through MHA):	
Foote	56 (42.1%)
Cleaborne	5 (3.8%)
Montgomery	56 (42.1%)
GE Patterson	11 (8.3%)
MHA Development not listed above	5 (3.8%)
Recruited through Memphis Health Center (MHC)	67 (32.8%)
Parent or Caregiver of at least one asthmatic	100 (49%)
Participated in another asthma education program	43 (21.1%)
Within the last 6 months	16 (7.8%)
Longer than 6 months ago	27 (13.2%)
Household size:	
3 and below	91 (44.6%)
4 and up	112 (54.9%)
Education:	
Some high school or less	64 (31.4%)
High school degree or GED	76 (37.3%)
Some college or more	64 (31.4%)

Preliminary Category Group Score Evaluation

The main measures of effectiveness of the Education Session in the PATH study will compare responses from the Second Survey (after the Education Session) to the First Survey (before the Education Session) to determine if there was an improvement. The first step is to compare item-by-item responses from the surveys (results not shown). The second step is to create more robust measures that will help evaluate changes in asthma knowledge (in general), changes in indoor asthma trigger knowledge, and changes in behavior related to reducing indoor asthma triggers.

To assess the main effects of the PATH Education Session on all Participants, study variables have been created by combining select survey responses. We have created a scoring method (coded using SAS, version 9) to compute the scores before and after the Education Session. Other measures will

be evaluated by degree of usefulness in asthma prevention, or by degree of problem (such as pest infestation).

Group Score: Asthma Knowledge – General

The first composite score combined survey responses to questions related to asthma knowledge in general (which was expected to increase after the Education Session). The survey questions were related to material that was covered in the Education Session. The asthma knowledge composite score was comprised of responses to questions regarding:

- recognizing signs that a person has asthma (e.g., coughing, wheezing, chest tightness)
- identifying reactions in the body that a person with asthma might experience (e.g., bronchoconstriction, inflammation, increased mucus production)
- evaluating asthma myths (e.g., regarding disease transmission, severity, indoor triggers, ability to exercise)
- actions that can help to control asthma symptoms (e.g., avoiding triggers, proper medication use/timing, regular medical visits)
- knowledge of items that might worsen asthma (e.g., air pollution, dust mites, cockroaches, tobacco smoke, weather extremes, pets, pests, pesticides, fragrances, pollen)

For study variables with a known response, a correct answer received 1 point. An incorrect or missing answer received zero points. A substantial improvement in asthma knowledge in general was seen from the survey results (Table 5). Using the established scoring scheme, the mean score on the First Survey improved from 17.8 to 20.9 on the Second Survey. (Standard deviations also provided to give an idea of spread.) Over three-quarters of participants improved their knowledge of asthma after the Education Session. Seven percent of participants showed no improvement across the surveys and fifteen percent. (Further data analysis will evaluate the statistical significance of these results.)

Group Score: Living Conditions - Pests

The second composite score combined survey responses to questions related to pest sightings. The Education Session provided information on how to identify pests, which are indoor asthma triggers, and on how to use Integrated Pest Management (IPM) to reduce pests. The pest composite score was comprised of responses regarding frequency of sighting of:

- cockroaches
- ants
- other insects
- mice
- rats

While ants and other insects are not known asthma triggers, they are indicators of IPM practices in general. Sighting of "never" received a score of 0; "less than once per week" received a score of 1; "more than once per month" received a score of 2. Thus, higher scores indicated more frequent pest sightings. The mean pest sighting score increased from the First Survey to the Second Survey, indicating more frequent pest sightings, on average, after the Education Session (Table 55).

However, the large standard deviations in relation to the scores indicate a large amount of variability in both scores. Just under half of respondents scored higher in the Second Survey (indicating *more* frequent pest sightings), while just over half of respondents scored lower on the Second Survey (indicating *less* frequent pest sightings). (Further data analysis will assess the statistical significance of these results.)

Group Score: Living Conditions – Home Conditions

The third composite score combined survey responses to questions related to conditions in the home that may worsen asthma. The Education Session provided information on how to conditions in the home which might trigger asthma and how to improve them. The home condition composite score was comprised of responses regarding:

- presence of a gas stove in the home (e.g., venting of the stove, use of the stove for heating
- mold sighting
- presence of a working exhaust fan in the bathroom (e.g., use of fan when bathing)
- building maintenance issues (e.g., holes in walls/ceilings, leaky pipes, wall cracks, water damage)

Negative home conditions issues were generally assigned a score of 1, while neutral home condition issues were assigned a 0. Thus, higher scores indicated a worse home condition. The mean home condition score nearly remained the same from the First Survey to the Second Survey (Table 5), potentially indicating that the participants had little control over these home condition items. Nearly three-quarters of the participants scored the same or lower in the Second Survey (indicating *no change or better* home conditions), while just under one third of respondents scored higher on the Second Survey (indicating *worse* home conditions). (Further data analysis will assess the statistical significance of these results.)

Table 5: Increases in Asthma Knowledge, Indoor Trigger Knowledge, and Behaviors After Education Program

Item	**First Survey** *Mean Score (s.d.)*	**Second Survey** *Mean Score (s.d)*	**Change Across Number of Survey Respondents** *Participants (%)*
Asthma Knowledge – General	17.8 (4.6)	20.9 (4.4)	**+:** 158 (77.5%) **0/-:** 46 (22.5%)
Living Conditions -- Pests	3.4 (2.9)	3.8 (3.1)	**+:** 91 (44.6%) **0/-:** 113 (55.4%)
Living Conditions – Home Conditions	2.9 (1.6)	2.8 (1.6)	**+:** 57 (27.9%) **0/-:** 147 (72.1%)

s.d. = standard deviation
+ = positive improvement in Second Survey results compared to First Survey
0/- = no improvement or decline in Second Survey results compared to First Survey

Future Analyses

Due to the short amount of time between data collection and the Annual Report, only some of the data have been analyzed thus far. The complete data analysis results will be presented in the Final Report (expected December 2009). The first analysis will further explore the relationships alluded to in Table 5. We will perform item-by-item examination of key survey responses, as well as further refine the grouping of responses shown here. Furthermore, we will assess these relationships for evidence of statistical significance. Three other analyses are described below, and are further described in Section 16 of the study protocol.

Child With Asthma: Subgroup Analysis

This analysis will be prepared for the Final Report. For this subgroup analysis, there are a few questions we hope to answer. These include:

- Does participating in PATH education program improve the child's asthma symptoms (as reported by the caregiver) and asthma-related caregiver quality of life?
- Which factors explain the change in the child's asthma symptoms (reported by caregiver) after the Education Session?
- Which factors explain the change in asthma-related caregiver quality of life after the Education Session?

Home Assessment

This analysis will also be completed for the Final Report. We will be determining what the observed levels of indoor asthma triggers are, if the self-reported and observed levels of indoor asthma triggers are correlated, and what the cockroach allergen levels in the home are based on the sticky trap evaluation.

Mixed Model Development

This analysis will be completed for the Final Report. The results that will be described include main effects by subgroup (e.g., MHA and MHC, those who completed the home assessment, and those with a child who has asthma). For Participants with an asthmatic child in the household, we may use mixed models to examine (1) overall improvements in quality of life; and (2) effect modification of quality of life.

The longitudinal model to examine overall improvements in quality of life over the course of the study is

$$Y_{ij} = \beta_0 + \beta_1 \, Time_{ij} + e_{ij} \qquad \text{Equation 1}$$

The general longitudinal model to examine effect modification is

$$Y_{ij} = \beta_0 + \beta_1 \text{Group}_i + \beta_2 \text{Time}_{ij} + \beta_3 \text{Group}_i \text{Time}_{ij} + e_{ij} \qquad \text{Equation 2}$$

where

Y_{ij} Total PACQLQ response (continuous);
i Participant;
j Time point (before or after the intervention, 0 or 1);
Time Continuous variable measured in weeks, before or after the education intervention;
Group Binary or categorical level for each effect modifier.

To evaluate effect modification, whether the intervention is more effective at improving quality of life for some Participants, we can consider the following effect modifiers for Group in Equation 2.

Demographic: Age of caregiver, age of asthmatic child, sex of caregiver, sex of asthmatic child, highest education level completed by caregiver, MHA or MHC, housing development if MHA.
Individual Health Risk Factors: body mass index of asthmatic child
Medical Care Indicators: having a primary care physician
Indoor Environmental Factors: self-reported smoking in the home, gas stove in the home, pest sightings, pesticide use, dust mite levels

Many effect modifiers can be dichotomized at the median level (e.g., asthmatic age below median or asthmatic age above median). Other effect modifiers may be categorical in nature (e.g., four MHA developments, no/medium/high pesticide use.)

IV. Conclusions, Recommendations, and Future Work

To date, the PATH study has successfully met its recruitment and community partnership development goals. Preliminary data analysis suggests that the Education Session was effective in increasing general knowledge about asthma in the target population. Additional data analysis will further explore this relationship, evaluate possible explanatory factors (e.g., sex, child with asthma, participated in home assessment), and describe other intangible benefits of the PATH study (such as community development, introducing MHA study participants to MHC services, and future collaborative activities between LOC and the community partners). We have successfully presented the PATH study at the USAMRMC Military Health Research Forum in Kansas City in August 2009 and will present study results at the American Public Health Association Annual Conference in Philadelphia in November 2009. We will describe these items in the Final Report, due in December 2009.